



IN THE UNITED STATES PATENT AND TRADE MARK OFFICE

In re Application of Yukio HANAMOTO et al.

Serial No. 10/808,515

Filed : March 25, 2004

Group Art Unit : 1752

Examiner : Shin J. LEE

CHEMICAL AMPLIFICATION RESIST COMPOSITION

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DECLARATION

I, Satoshi YAMAMOTO, residing at 2-10-4-451,  
Sonehigashino-cho, Toyonaka-shi, Osaka, 561 -0802, Japan, declare  
and say:

that I was graduated from Department of Industrial Chemistry in  
Osaka Prefectural College of Technology in March 1992.

Since April 1992 to the present, I have been employed by  
Sumitomo Chemical Co., Ltd., assignee of the above-identified  
application, and, since 2002 to the present, I have been engaged in  
research and development in the field of adhesives for liquid crystal  
displays and photoresists;

that I am one of the inventors of the invention of the  
above-identified application; and

that in order to show the unexpected results obtained by the resist

composition of the present invention, I beg to submit the following experimental data which have been obtained under my supervision:

### Experiments

In the examples, the “%” and “part(s)” used to represent the content of any component and the amount of any material used in the following examples are on a weight basis unless otherwise specifically noted. The weight-average molecular weight of any material used in the following examples is a value found by gel permeation chromatography using styrene as a standard reference material.

#### Resin Synthesis Example 1 (synthesis of resin A)

Into a four necked flask with replacing air by nitrogen, 2-ethyl-2-adamantyl methacrylate, 3-hydroxy-1-adamantyl methacrylate and 5-acryloyloxy-2,6-norbornanecarbolactone were charged at a molar ratio of 5:2.5:2.5 (20.0 parts:9.5 parts:7.3 parts), and methyl isobutyl ketone in twice weight based on all monomers was added, to prepare solution. To the solution was added azobisisobutyronitrile as an initiator in a ratio of 3.0 % by mol based on all monomer molar amount, and the mixture was heated at 80 °C for about 8 hours. Then, the reaction solution was poured into large amount of heptane to cause precipitation, and this operation was repeated three times, and then, the precipitate was dried. As a result, copolymer having a weight-average molecular weight of about 9,000 was obtained. This is called crude resin A.

#### Treated Resin Solution Production 1

25 Parts of the crude resin A obtained in Synthetic Example 1 was dissolved in 75parts of 2-heptanone. To the solution was added 2.5 parts of activated carbon ( Trade Name: CARBORAFIN, pore size: 30 Å, specific surface

area: 1500 m<sup>2</sup>/g, manufactured by Takeda Chemical Co., Ltd. ) and the mixture was stirred for 4 hours. Then, the treated mixture was filtrated by pressure filtration using 5 µm filter made of polytetrafluoroethylene to obtain treated resin solution (1).

#### Treated Resin Solution Production 2

Experiment was conducted in the same manner as in Treated Resin Solution Production 1 except the activated carbon was changed to ion-exchange resin ( A mixture of sulfonated and tertiary aminated divinylbenzene/styrene copolymer, Trade Name: DUOLITE UP7000, manufactured by Rohm & Haas Co., Ltd. ) to obtain treated resin solution (2).

#### Example 1

10 Parts, as solid content, of treated resin solution (1) (converted to total weight of solid components), 0.7 parts of (4-methylphenyl)diphenylsulfonium perfluorobutanesulfonate, and 0.15 part of 2,6-diisopropylaniline were dissolved in a mixed solvent of 75.0 parts of propylene glycol monomethyl ether acetate, 35.0 parts of 2-heptanone (including a portion from resin solutions) and 3.0 parts of γ-butyrolactone to obtain resist composition. The composition was filtrated by 0.2 µm filter made of PTFE (polytetrafluoroethylene) and 0.1 mm filter made of UPE (Ultra High Molecular Weight Polyethylene) both produced by Nihon Mykrolis K.K. to obtain a preliminary filtered resist composition.

Evaluation of the preliminary filtered resist composition above. was conducted by the measurement of clogging degree in the same manner as shown in the specification, pages 45 to 46.

The result is shown in Table 1.

#### Comparative Example 1

25 Parts of the crude resin A obtained in Synthetic Example 1 was dissolved in 75parts of 2-heptanone to obtain crude resin solution (1).

Experiment was conducted in the same manner as in Example 1 except the treated resin solution (1) was changed to crude resin solution (1). The result is shown in Table 1.

#### Comparative Example 2

Experiment was conducted in the same manner as in Example 1 except the treated resin solution (1) was changed to treated resin solution (2). The result is shown in Table 1.

Table 1

	Exp. 1	Comp. Ex. 1	Comp. Exp. 2
Clogging Degree	0.94	0.75	0.81

As apparent from the results of Example 1 and Comparative Example 2, the composition obtained in Example 1, which corresponds to the present composition and was treated with activated carbon, has excellent filtration property compared to the composition obtained in Comparative Example 2, which was treated with ion-exchange resin.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United State Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this                      day of November 2005.

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Satoshi YAMAMOTO